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Geospatial Extension Program

PRESS RELEASE
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USU professors receive $650,000 NASA grant to research the impact of remote sensing on wheat production

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LOGAN, Utah — Drs. Phil Rasmussen and Bruce Bugbee, both professors in the Utah State University Plants, Soils, and Biometeorology department, recently received a $650,000 grant from NASA and the USDA Initiative for Future Agriculture and Food Systems Program (IFAFS). The grant will support their research into remote sensing, as well as allow them to train county extension agents in this technology.

This grant complements the recent NASA grant that established Rasmussen as the first geospatial extension specialist in the nation. Rasmussen has spent many years researching how remote sensing techniques can help farmers. Remote sensing (or geospatial sensing) is the use of aerial and satellite images to survey an area, such as a farmer's field. It can be used in farming to detect a lack of nitrogen or water, weed infestations, or other areas of poor yield.

Rasmussen and Bugbee have titled their research "Validation and Application of Geospatial Information For Early Identification of Stress in Wheat." Their research will be a three-step process that will look at using remote sensing to determine if a wheat field is suffering from a lack of nitrogen (fertilizer) or water. They will then try to fix these problems and optimize the quality and quantity of the wheat harvest.

"Clearly, if a simple method can be refined to simultaneously detect nitrogen and moisture stress, farmers would readily adopt this new technology," Rasmussen said. "Environmental benefits would include less groundwater pollution or offsite contamination, as well as decreased energy, nutrient, and irrigation inputs."

Currently, farmers try to find areas of their field that need fertilizer or moisture by simply observing the field. This is not very effective nor accurate. Sometimes farmers may try to avoid the problem by overfertilizing or overwatering, but this can be dangerous to the environment.

“Precision agriculture is adding just the right amount of inputs,” Bugbee said. “In the past, we’ve had the luxury of erring on the positive side. We just cannot do that anymore.”

However, underfertilizing or underwatering can be just as deadly to a farmer’s economic situation. Modern farmers compete in a global marketplace requiring better and cheaper products. If a farmer’s field lacks nitrogen or water, his wheat won’t have a good enough quality to sell.

“The producer now faces a marketplace that is increasingly price-sensitive to crop quality,” Rasmussen said. “This can, literally, mean the difference between profit and loss at the farm level.”

Rasmussen and Bugbee, ultimately, want to help farmers increase their profits. Bugbee supervises the USU greenhouses that are developing better crops for space travel and space stations. He is an expert at developing crops in experiment tubes under predetermined conditions. Rasmussen specializes in remote sensing and technology, and he was named the first NASA Space Grant/Land Grant Extension Specialist in 1999. The project will combine both of their talents.

“What funds me is trying to feed people in space,” Bugbee said. “What funds Phil’s projects is feeding people here on earth. The power of this project was helping NASA realize we can link these two skills.”

Rasmussen and Bugbee’s project has been approved for three years. In the first year, they will study new, inexpensive, narrow-band spectrometer sensors in greenhouses and small plots. They will use the technology to look for nitrogen and moisture stress. In the second year, they will do the testing with satellite and aerial images on two irrigated, center-pivot plots and two dryland plots. They will compare their methods to standard farmer/rancher practices. In the third year, they will test the new technology on actual farms with county extension agricultural agents and participating farmers. They will then try to communicate their findings to local farmers.

“This knowledge is of little value unless it can be shared with farmers,” Rasmussen said. “Extension is the key.”

Rasmussen and Bugbee hope that after three years, they will have concrete research about methods available to help farmers’ help their fields. A survey of wheat growers found that yield, fertilizer application, and vigor/stress of crops were three of the top six priority areas for research. This project will address all three of these concerns and the results will be applicable to other grain crops as well.

“Remote sensing will help farmers increase food production in the future,” Rasmussen said.